

ABSTRACT

Methods and apparatus for mixing a plurality of gases, preferably a fuel and an oxidant. The preferred embodiments are characterized by methods and apparatus for mixing at least a methane-containing gas and an oxygen-containing gas, preferably natural gas and molecular oxygen. The preferred embodiments of the present invention include a mixing section having a centrifugal mixer with a tangential inlet where the mixed gases are then injected at an angle into the reactor section. The oxidant and the fuel are mixed by the tangential motion of the fuel to form a reactant gas that then flows through a permeable mixing material that is also disposed within the chamber. The reactant gas injected at an angle into a reactor inlet chamber provides a substantially unobstructed path between the reactor and a pressure relief device.

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